

1. A method to form passivation openings that prevent protective tape residue in the manufacture of an integrated circuit device comprising:

providing a semiconductor substrate;

5 depositing a passivation layer overlying said semiconductor substrate;

depositing an organic photoresist layer overlying said passivation layer;

patterning said organic photoresist layer to expose said passivation layer in areas where said passivation openings are planned;

10 reflowing said organic photoresist layer to create gradually sloping sidewalls on said organic photoresist layer;

etching through said passivation layer not covered by said organic photoresist layer to form said passivation openings with gradually sloping sidewalls;

15 stripping away said organic photoresist layer;

applying a protective tape overlying said passivation layer and said passivation openings; and

20 removing said protective tape wherein said gradually sloping sidewalls on said passivation openings allow said protective tape to be completely removed without leaving adhesive residue in the manufacture of the integrated circuit device.

2. The method according to Claim 1 wherein said passivation layer comprises silicon nitride.

3. The method according to Claim 1 wherein said passivation layer is deposited to a thickness of between about 3,000 Angstroms and 15,000 Angstroms.

4. The method according to Claim 1 wherein said organic photoresist layer is deposited to a thickness of between about 10,000 Angstroms and 50,000 Angstroms.

5. The method according to Claim 1 wherein said step of reflowing said organic photoresist layer is performed at a temperature of between about 140 degrees C and 200 degrees C for a duration of between about 3 minutes and 15 minutes.

6. The method according to Claim 1 wherein said step of etching through said passivation layer comprises a dry plasma etching process using an etching chemistry comprising CF₄ and O₂ gases.

7. The method according to Claim 1 wherein said step of removing said protective tape is by use of a peeling tape.

8. The method according to Claim 1 further comprising grinding the backside of said semiconductor substrate after said step of

applying said protective tape and prior to said step of removing said protective tape.

9. A method to form bonding pad openings that prevent tape residue in the manufacture of an integrated circuit device comprising:

providing a semiconductor substrate;

5 providing a metal layer overlying said semiconductor substrate;

depositing a passivation layer overlying said metal layer;

depositing an organic photoresist layer overlying said passivation layer;

10 patterning said organic photoresist layer to expose said passivation layer in areas overlying said metal layer where said bonding pad openings are planned;

reflowing said organic photoresist layer to create gradually sloping sidewalls on said organic photoresist layer;

15 etching through said passivation layer not covered by said organic photoresist layer to form said bond pad openings with gradually sloping sidewalls;

stripping away said organic photoresist layer;

20 applying a protective tape overlying said passivation layer and said bond pad openings; and

removing said protective tape wherein said gradually sloping sidewalls on said passivation openings allow the

protective tape to be completely removed without leaving adhesive residue and wherein said removing is by use of a peeling tape in the manufacture of the integrated circuit device.

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10. The method according to Claim 9 wherein said passivation layer comprises silicon nitride.

11. The method according to Claim 9 wherein said passivation layer is deposited to a thickness of between about 3,000 Angstroms and 15,000 Angstroms.

12. The method according to Claim 9 wherein said organic photoresist layer is deposited to a thickness of between about 10,000 Angstroms and 50,000 Angstroms.

13. The method according to Claim 9 wherein said step of reflowing said organic photoresist layer is performed at a temperature of between about 140 degrees C and 200 degrees C for a duration of between about 3 minutes and 15 minutes.

14. The method according to Claim 9 wherein said step of etching through said passivation layer comprises a dry plasma etching process using an etching chemistry comprising CF₄ and O₂ gases.

15. The method according to Claim 9 further comprising grinding the backside of said semiconductor substrate after said step of applying said protective tape and prior to said step of removing said protective tape.

16. A method to form bonding pad openings that prevent tape residue in the manufacture of an integrated circuit device comprising:

providing a semiconductor substrate;

providing a metal layer overlying said semiconductor substrate;

depositing a passivation layer overlying said metal layer wherein said passivation layer comprises silicon nitride;

depositing an organic photoresist layer overlying said passivation layer;

patterning said organic photoresist layer to expose said passivation layer in areas overlying said metal layer where said bonding pad openings are planned;

15 reflowing said organic photoresist layer to create gradually sloping sidewalls on said organic photoresist layer;

etching through said passivation layer not covered by said passivation layer to form said bond pad openings with gradually sloping sidewalls;

stripping away said organic photoresist layer;

20 applying a protective tape overlying said passivation
layer and said bond pad openings;

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grinding the backside of said semiconductor substrate; and
removing said protective tape wherein said gradually
sloping sidewalls on said passivation openings allow the
protective tape to be completely removed without leaving
adhesive residue and wherein said removing is by use of a
peeling tape in the manufacture of the integrated circuit
device.

17. The method according to Claim 16 wherein said passivation
layer is deposited to a thickness of between about 3,000
Angstroms and 15,000 Angstroms.

18. The method according to Claim 16 wherein said organic
photoresist layer is deposited to a thickness of between about
10,000 Angstroms and 50,000 Angstroms.

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19. The method according to Claim 16 wherein said step of
reflowing said organic photoresist layer is performed at a
temperature of between about 140 degrees C and 200 degrees C
for a duration of between about 3 minutes and 15 minutes.

20. The method according to Claim 16 wherein said step of
etching through said passivation layer comprises a dry plasma

etching process using an etching chemistry comprising CF_4 and O_2 gases.